FMS di-π^0 update

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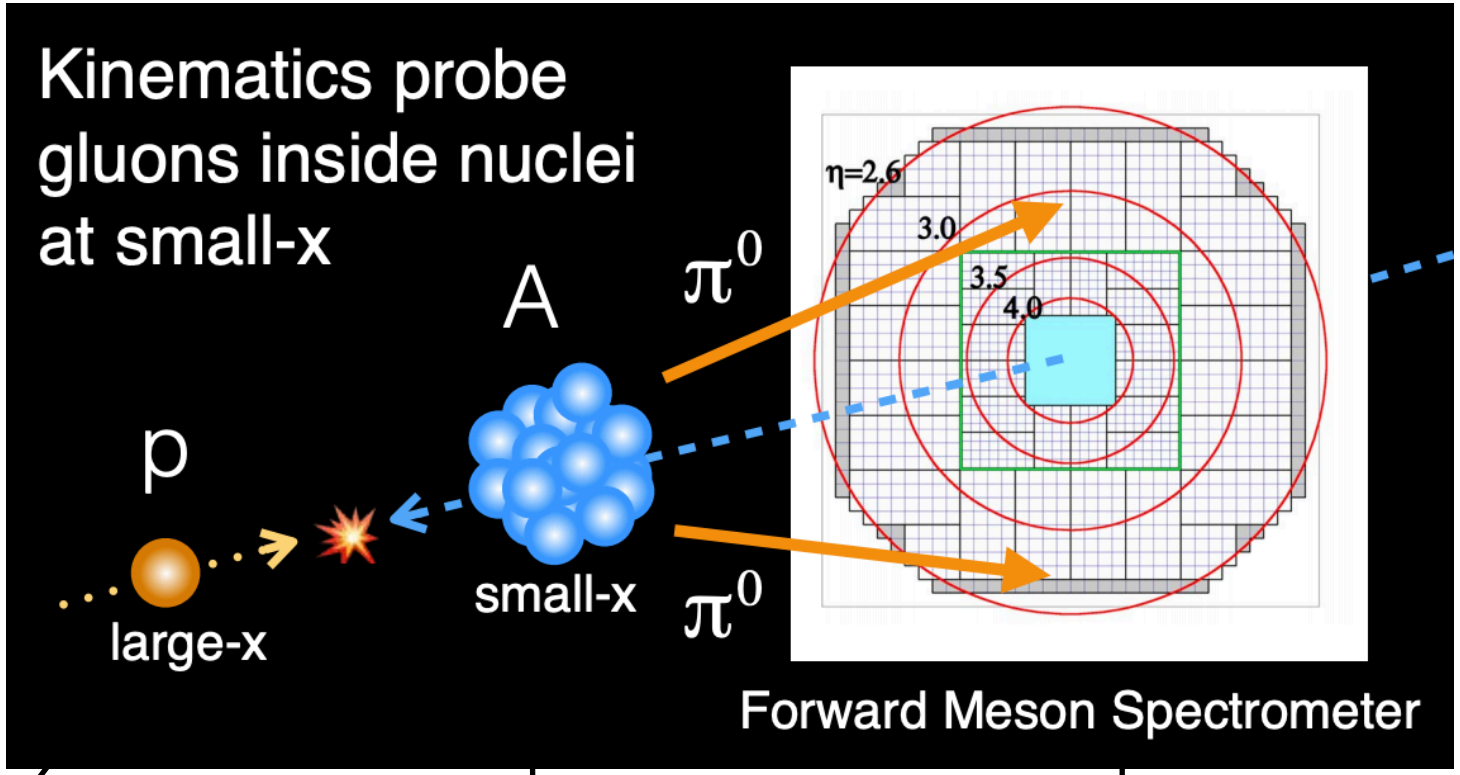
A brief reminder

Prithwish Tribedy, Initial Stages 2021

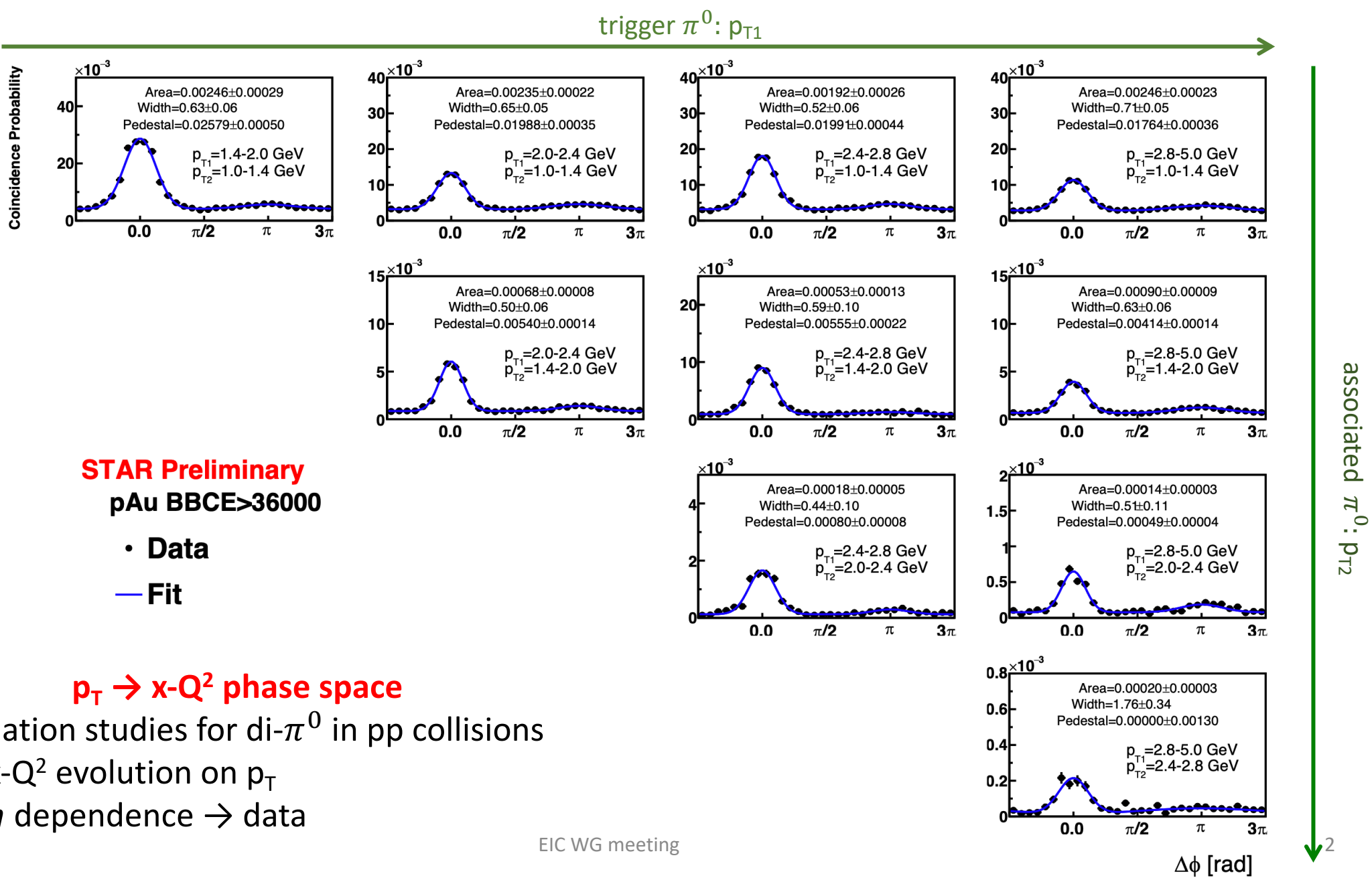


$$x_1 = \frac{p_{T1}\, e^{y_1} + p_{T2} e^{y_2}}{\sqrt{s}}$$

$$x_2 = \frac{p_{T1}\, e^{-y_1} + p_{T2} e^{-y_2}}{\sqrt{s}}$$

FMS: 2.6< η<4.0

- Large cell detector: 2.6< η<3.3
- Small cell detector: 3.3< η<4.0



STAR Preliminary

pAu BBCE>36000

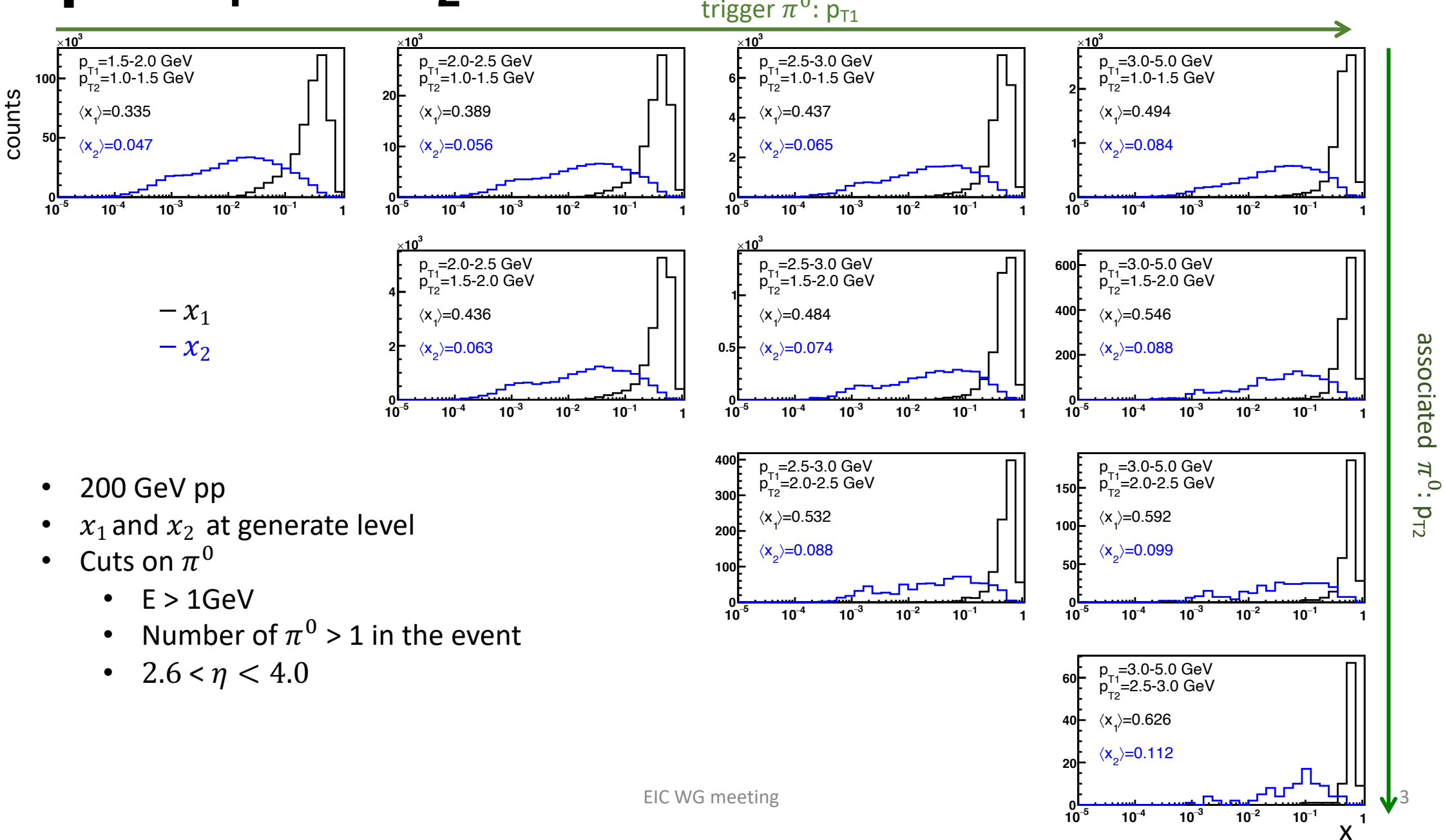
- **Data**

— **Fit**

p_T → x-Q^2 phase space

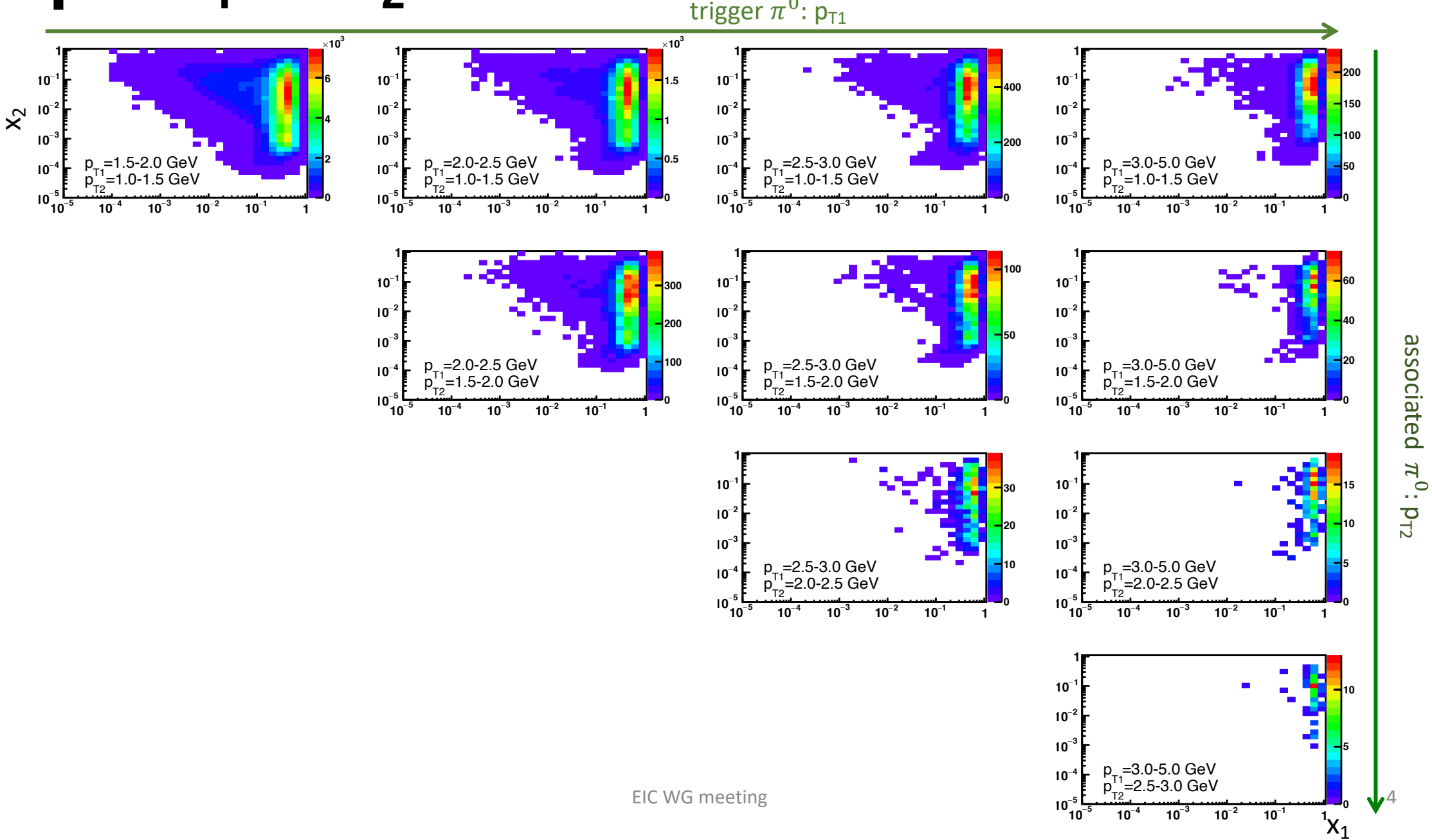
- Simulation studies for di-π^0 in pp collisions
  - x-Q^2 evolution on p_T
  - η dependence → data

Input x_1 and x_2 from simulation

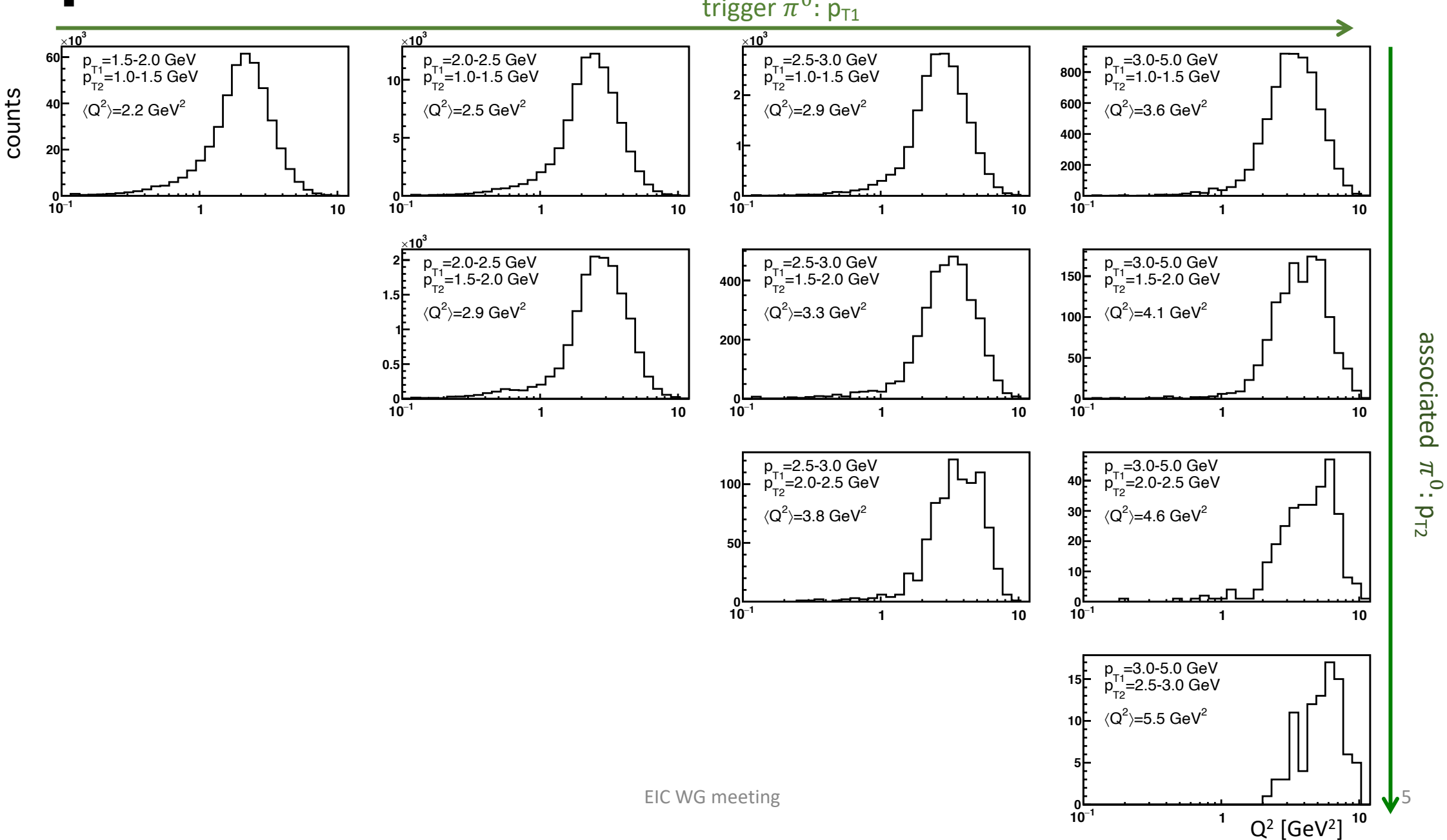


- 200 GeV pp
- x_1 and x_2 at generate level
- Cuts on π^0
  - E > 1GeV
  - Number of π^0 > 1 in the event
  - $2.6 < \eta < 4.0$

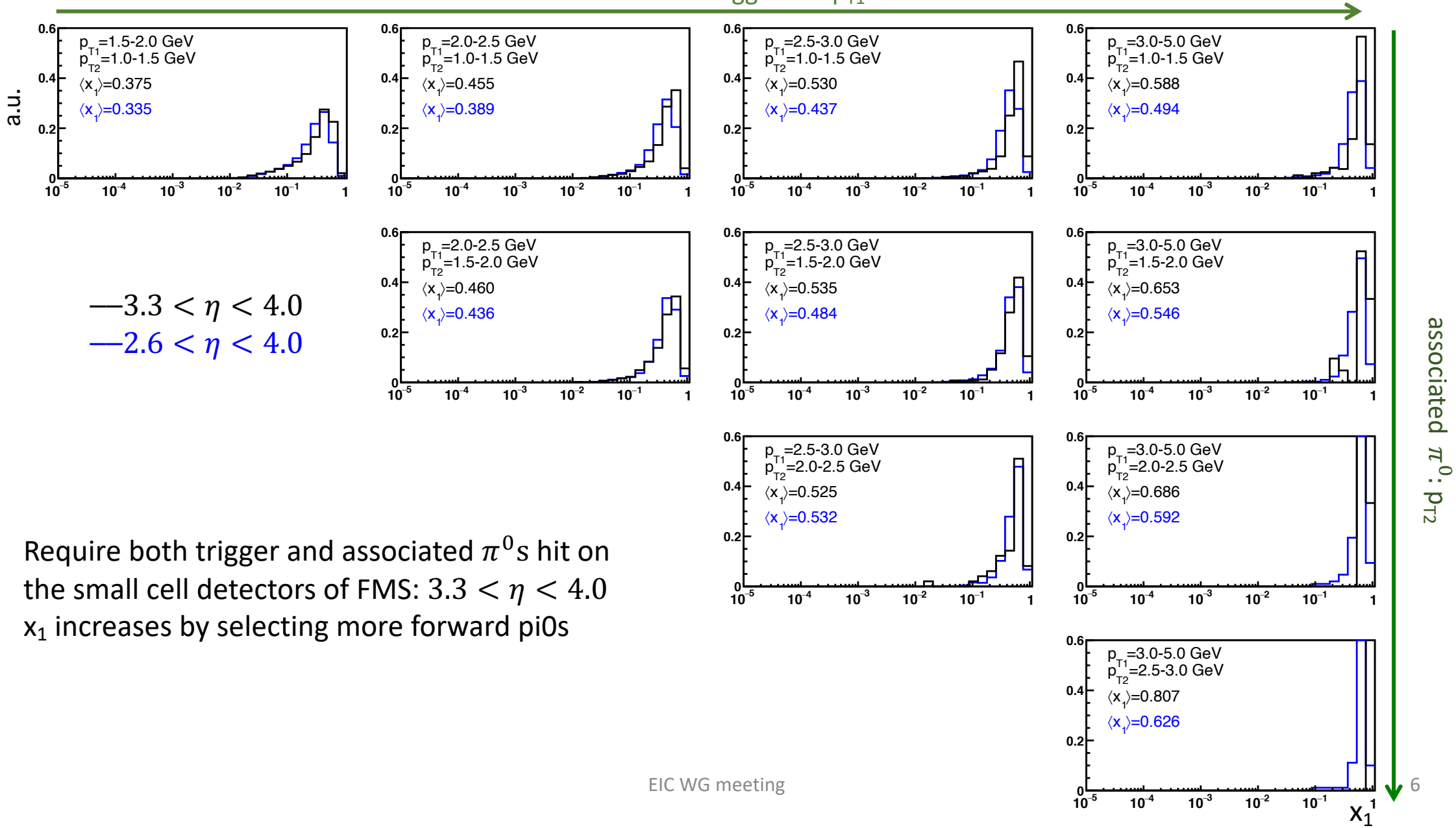
Input x_1 Vs x_2 from simulation



Input Q^2 from simulation



x_1 dependence on η

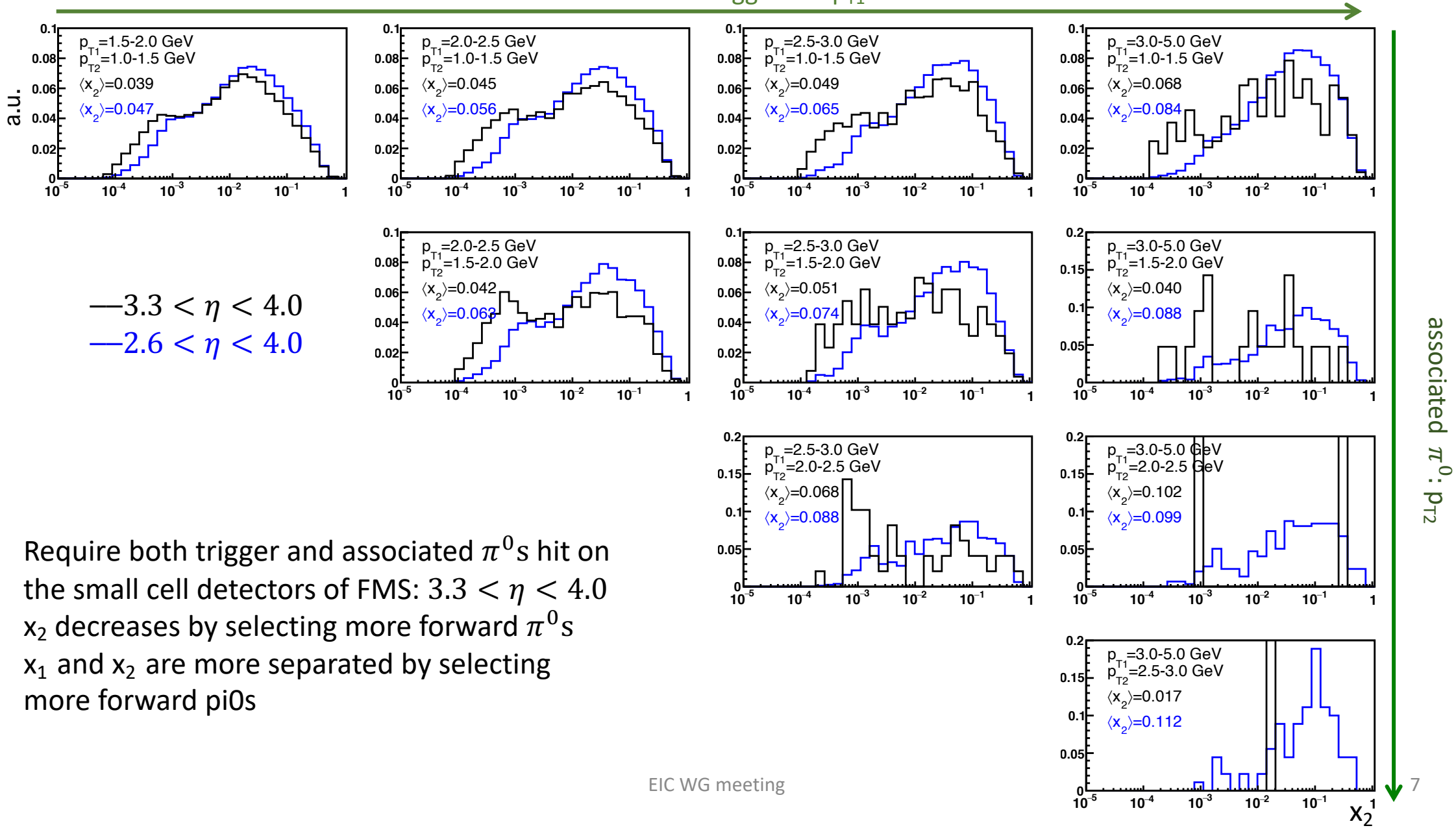


—$3.3 < \eta < 4.0$

—$2.6 < \eta < 4.0$

- Require both trigger and associated π^0s hit on the small cell detectors of FMS: $3.3 < \eta < 4.0$
- x_1 increases by selecting more forward pi0s

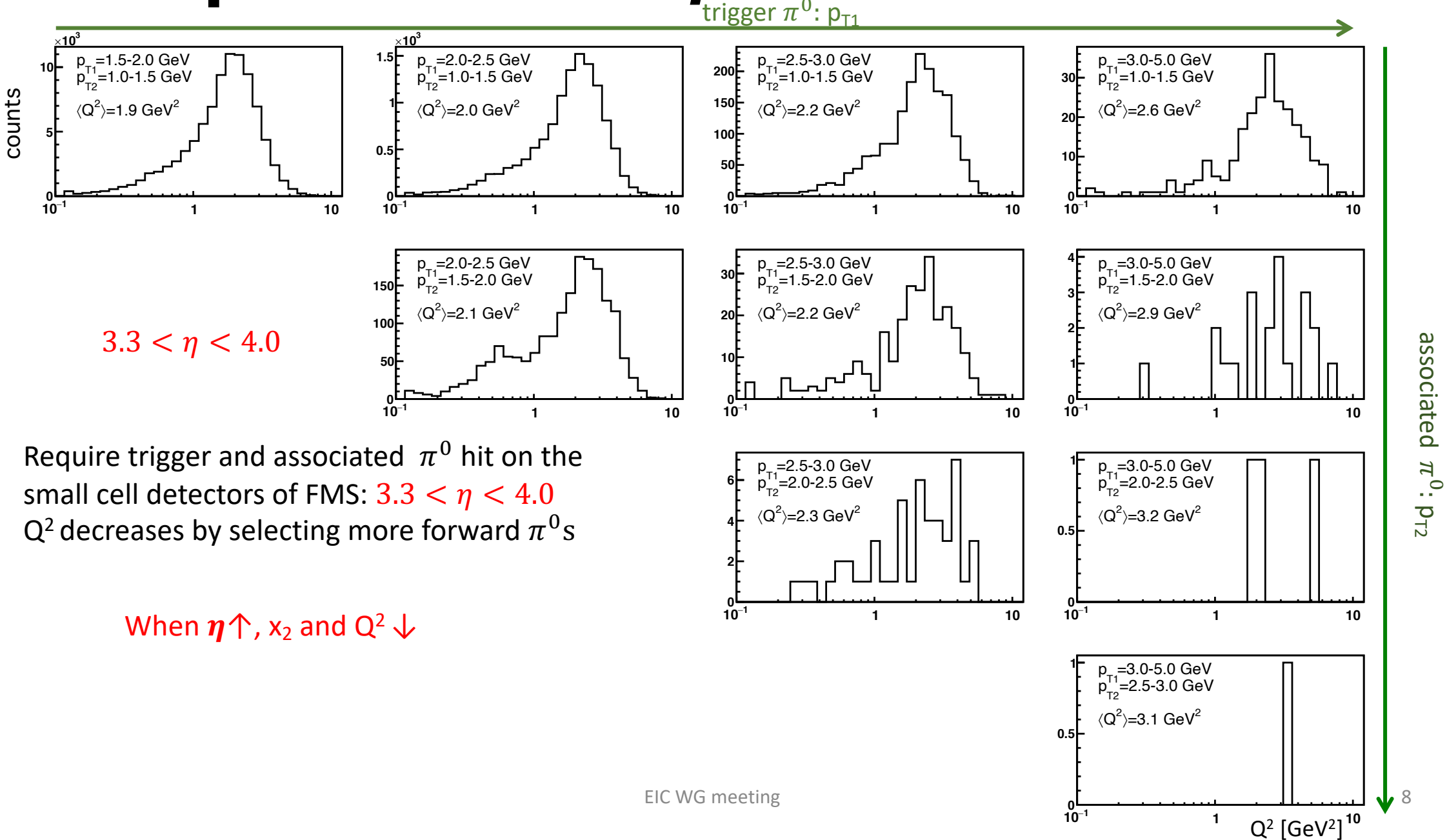
x_2 dependence on η



—$3.3 < \eta < 4.0$
—$2.6 < \eta < 4.0$

- Require both trigger and associated π^0s hit on the small cell detectors of FMS: $3.3 < \eta < 4.0$
- x_2 decreases by selecting more forward π^0s
- x_1 and x_2 are more separated by selecting more forward pi0s

Q^2 dependence on η

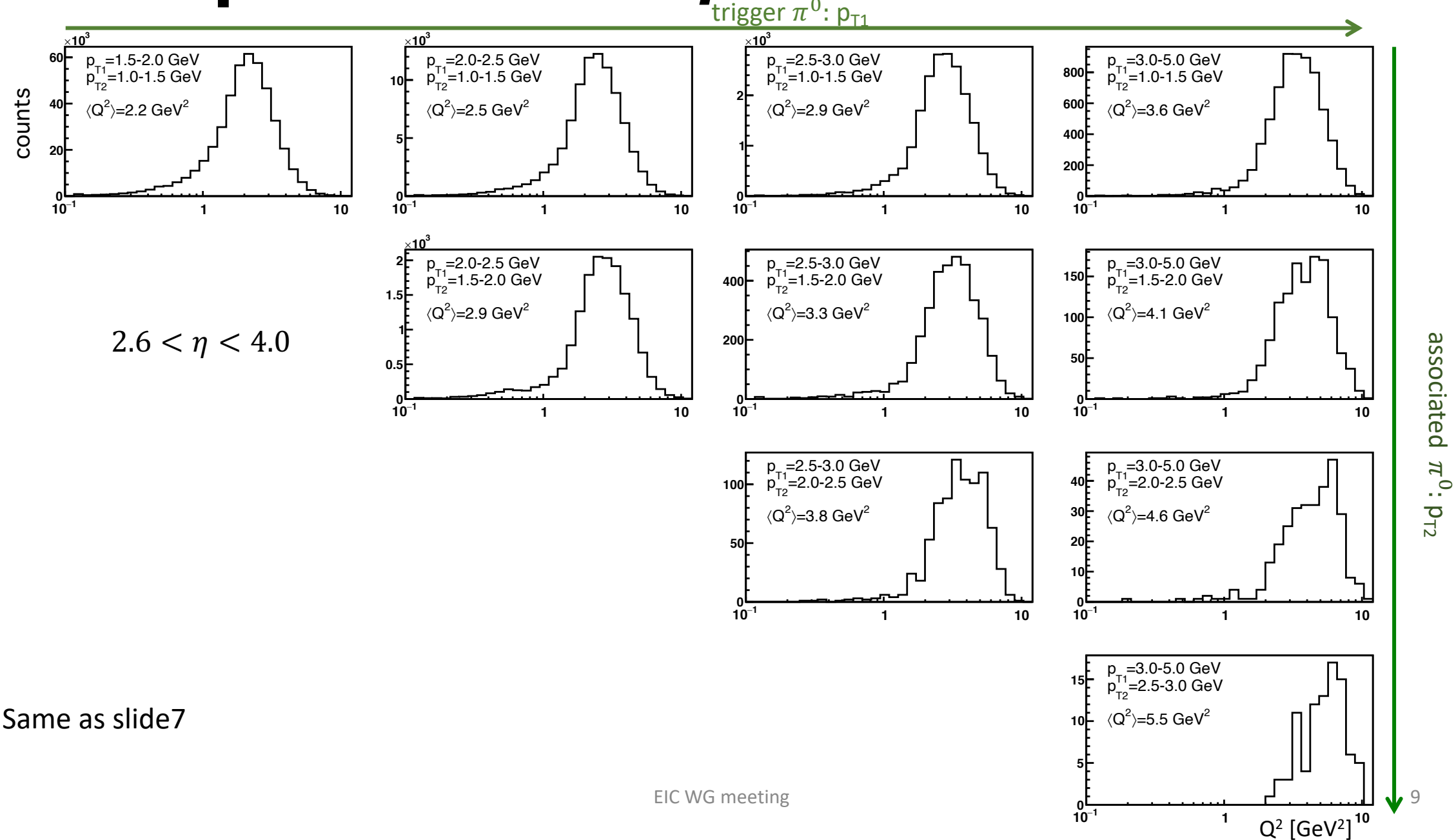


$3.3 < \eta < 4.0$

- Require trigger and associated π^0 hit on the small cell detectors of FMS: $3.3 < \eta < 4.0$
- Q^2 decreases by selecting more forward π^0s

When $\eta\uparrow$, x_2 and $Q^2\downarrow$

Q^2 dependence on η



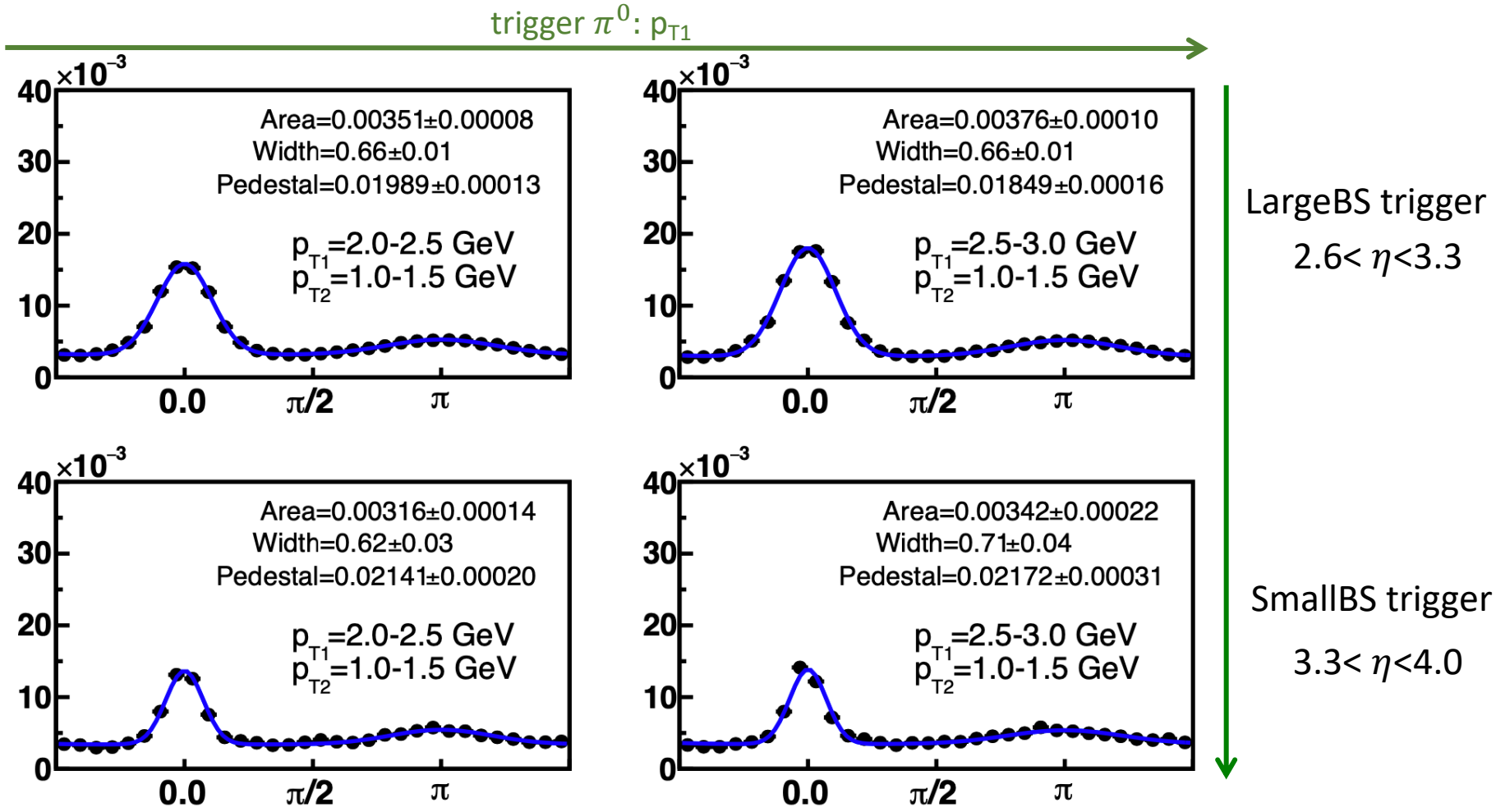
$2.6 < \eta < 4.0$

Same as slide7

η dependence in pAu data?

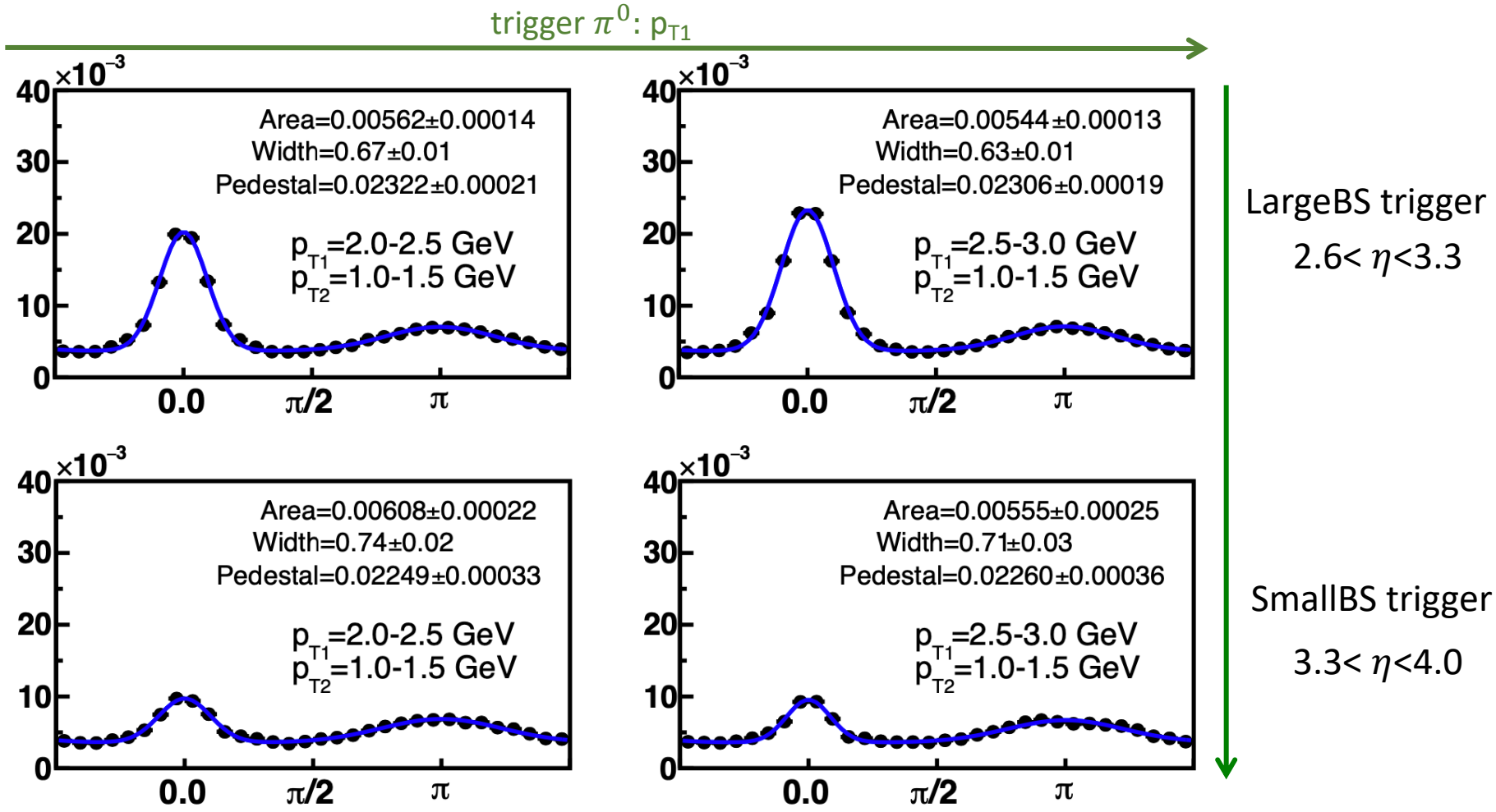
Fixed p_{T2} = 1.0-1.5 GeV

Can we see more suppression at more forward directions?

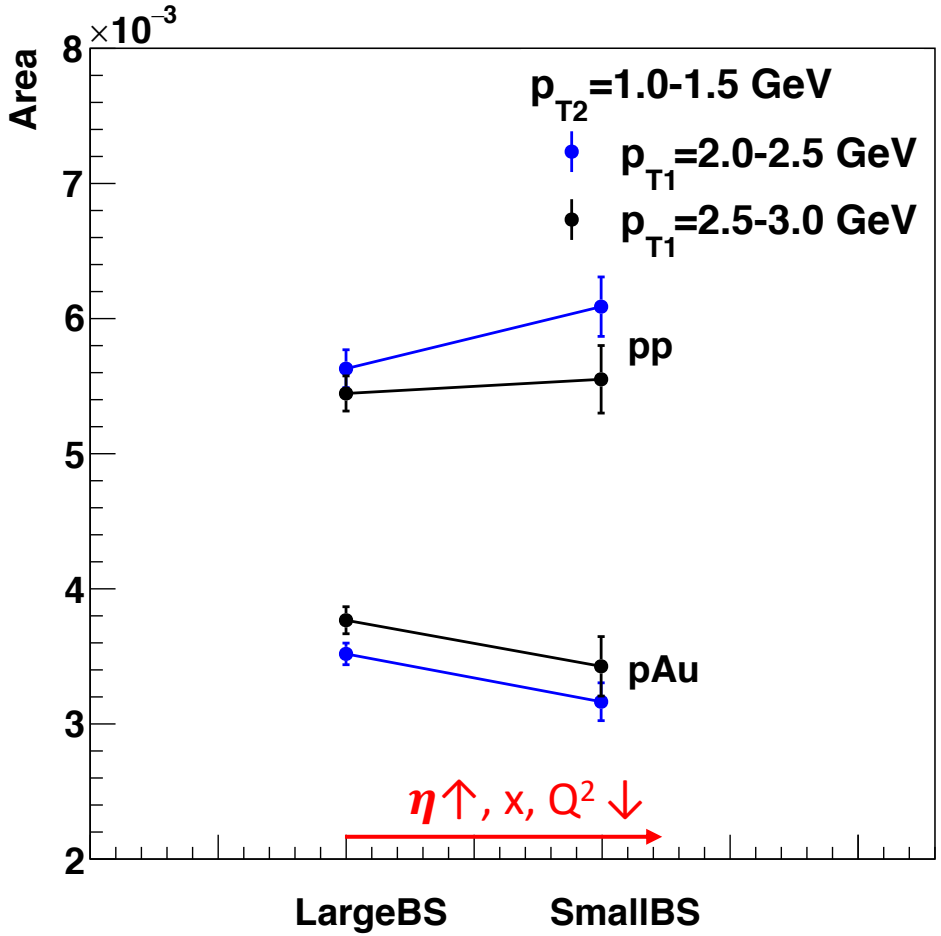


η dependence in pp data?

Fixed p_{T2} = 1.0-1.5 GeV



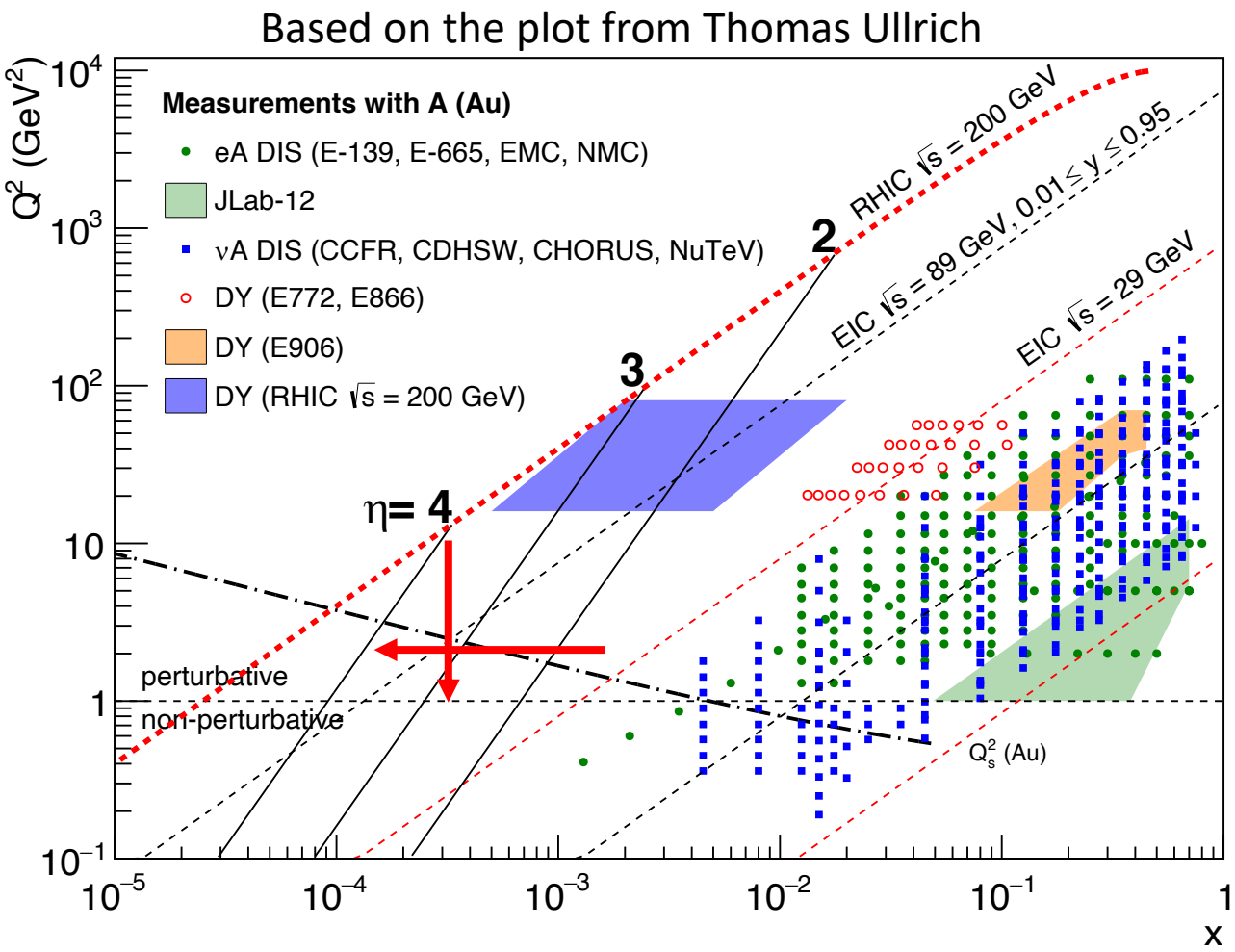
η dependence in data



At small p_T:

- Trigger dependence trend:
  - pp: Back-to-back di-π^0 yields ↑ when η ↑ (1.8σ@ low p_T)
  - pAu: Back-to-back di-π^0 yields ↓ when η ↑ (2.6σ@ low p_T)

Summary

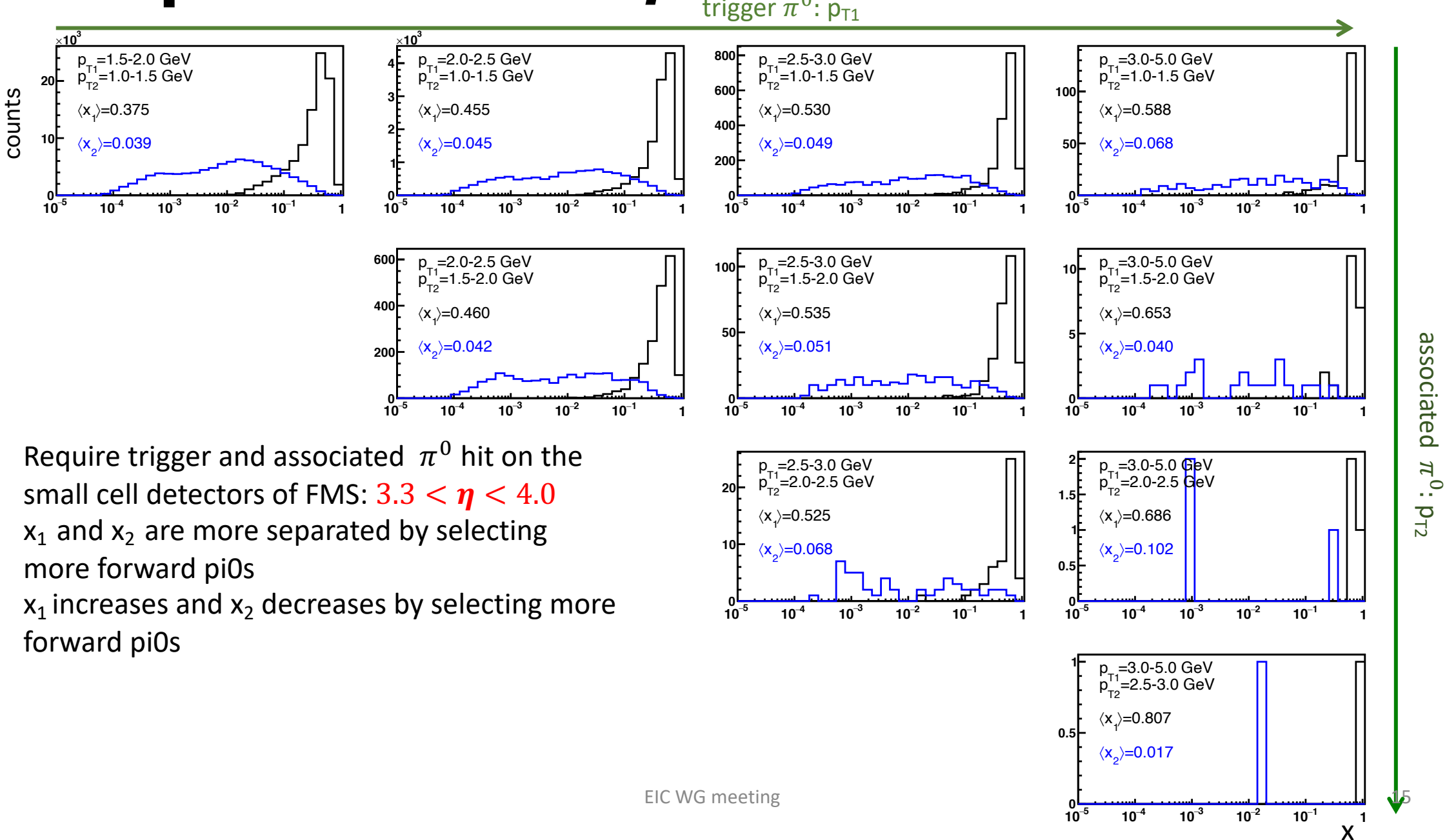


Summary:

- Probing high p_T π^0 → low pT π^0, large *x* (Q^2) → small *x* (Q^2)
- Non saturation → Saturation region
- Slight η dependence shows in the data: FMS rapidity is high itself.

Back up

x dependence on η



- Require trigger and associated π^0 hit on the small cell detectors of FMS: $3.3 < \eta < 4.0$
- x_1 and x_2 are more separated by selecting more forward pi0s
- x_1 increases and x_2 decreases by selecting more forward pi0s

pp at low p_T:
(0.00608-0.00562)/sqrt(0.00014*0.00014+0.00022*0.00022)~1.8